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J Michael Neary
Neary Law Office
542 SW 298th Street
Federal Way, WA 98023

EXAMINER	
COMPTON, ERIC B	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No. 10/069,384	Applicant(s) JULIEN, GERALD J.
	Examiner Eric B. Compton	Art Unit 3726

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 12-20* is/are rejected.

7)☒ Claim(s) *11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Priority

1. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

> An application in which the benefits of an earlier application are desired must contain a specific reference to the prior application(s) in the first sentence of the specification or in an application data sheet (37 CFR 1.78(a)(2) and (a)(5)). The specific reference to any prior nonprovisional application must include the relationship (i.e., continuation, divisional, or continuation-in-part) between the applications except when the reference is to a prior application of a CPA assigned the same application number.

It is noted that per 37 CFR 1.78, such amendment to the first sentence or such application data sheet must be submitted "within the later of four months from the actual filing date of the later-filed application or sixteen months from the filing date of the prior-filed application", which time periods were already past at the time of mailing of the previous office action (mailed September 10, 2003). It is noted that 37 CFR 1.78 sets forth the criteria for filing a petition to accept an unintentionally delayed claim under 35 USC 120, 121, or 365(c) for the benefit of a prior-filed application, and that one such criterion sets forth that the reference required by 35 USC 120 to the prior-filed application, unless previously submitted, must be supplied.

Since this action is a final rejection, it is noted that such an amendment to the first sentence of the specification that is being submitted with such a petition in accordance with 37 CFR 1.78 should be submitted separately from other amendments

made after final rejection. The separate submission of such amendment is to avoid any non-entry of the amendment to the first sentence of the specification due to any possible advisory action indicating non-entry of the whole amendment, since such amendments are generally not entered in part except in accordance with those circumstances set forth in MPEP section 714.20.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,843,152 to Tu et al.

Tu et al disclose a sphere (14, e.g. a ball) of Nitinol. *See* Col. 6, lines 26-29. "NiTi represents nickel-titanium alloys which are commonly referred to as Nitinol alloys. This abbreviations will include alloys containing from 53 to 62, ... weight percent of nickel with the remainder of the alloy being essentially titanium." *See* U.S. Patent 4,561,272, at Col. 2, lines 8-13. However, the reference does not explicitly disclose the use of Nitinol 60 alloy.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used Nitinol 60 alloy, since it has been held to be within the

general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960). Furthermore, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (BPAI 1987).

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,561,272, to Goldstein.

Goldstein discloses a rod (10) of Nitinol. *See* Col. 2, lines 27-28. "NiTi represents nickel-titanium alloys which are commonly referred to as Nitinol alloys. This abbreviations will include alloys containing from 53 to 62, ... weight percent of nickel with the remainder of the alloy being essentially titanium." *Id.*, at lines 8-13. However, the reference does not explicitly disclose the use of Nitinol 60 alloy.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used Nitinol 60 alloy, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960). Furthermore, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (BPAI 1987).

5. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,324,441 to Rouverol et al.

Rouverol et al disclose an annular ring (132,133) of a shape-memory nickel-titanium alloy. *See* Col. 6, lines 21-43. Nitinol is a shape-memory alloy of nickel and titanium. *See* generally U.S. Pat. 4,657,822, Col. 4, lines 27-29. "NiTi represents nickel-titanium alloys which are commonly referred to as Nitinol alloys. This abbreviations will include alloys containing from ***53 to 62***, ... weight percent of nickel with the remainder of the alloy being essentially titanium." *See* U.S. Patent 4,561,272, at Col. 2, lines 8-13 (emphasis added). However, the reference does not explicitly disclose the use of Nitinol 60 alloy.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used Nitinol 60 alloy, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960). Furthermore, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (BPAI 1987).

6. Claims 1, 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rouverol et al in view of U.S Patent 3,283,376 to Hockin and U.S. Patent 3,422,663 to James et al.

Rouverol et al disclose the use of nickel-titanium shape-memory alloys for bearing parts. Col. 6, lines 21-33; Col 5, lines 26-30 (contemplating roller bearings).

> Because of the large critical dimension changes as they are heated through the critical temperature, shape-memory materials are useful in the present invention both for rolling surfaces and the prestressing elements. In the case of rolling surfaces, the presstressing techniques herein describes overcome the disadvantages that nickel-titanium is not hardenable, ***allowing greatly increased Hertzian pressures which combine with a low Young's modulus to give a modulus of resilience comparable to that of hardened steel.***

Col. 6, lines 34-43 (emphasis added). Nitinol is a shape-memory alloy of nickel and titanium. *See* generally U.S. Pat. 4,657,822, Col. 4, lines 27-29. "NiTi represents nickel-titanium alloys which are commonly referred to as Nitinol alloys. This abbreviations will include alloys containing from ***53 to 62***, ... weight percent of nickel with the remainder of the alloy being essentially titanium." *See* U.S. Patent 4,561,272, at Col. 2, lines 8-13 (emphasis added). However, the reference does not explicitly disclose the use of Nitinol 60 alloy.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used Nitinol 60 alloy, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960).

However, Rouverol et al do not discloses forming the bearing elements by a casting process.

Hockin discloses utilizing sand casting molds to form various shapes of bearing components, esp. spherical balls (2). The method comprises: making a sand mold

having a cavity with an internal shape like the desired shape of the element formed (see Figure 3); pouring molten metal into the cavity cooling the mold to solidify the molten metal form (col. 3, lines 23-35); and disintegrating the mold to remove metal form (inherent with an investment sand casting method). The bearing parts are then individually removed from a solidified branch of the casting.

It would have been obvious to one having ordinary skill in the art at the time the invention was made, to have formed the Nitinol bearings elements of Rouverol et al, by a casting process, in light of the teachings of Hockin, in order to "yield a substantially spherical ball baring which is sufficiently exact in dimension to eliminate or significantly reduce subsequent machining." Col. 3, lines 45-47.

However, Rouverol et al/Hockin do not disclose that the mold is a ceramic mold.

James et al discloses that sand mold casting and ceramic mold casting are well known and equivalents in the casting art. Col. 1, lines 40-49; **See** also U.S. Patent 4,938,802 to Noll et al, Col.,1, lines 12-30 (disclosing both ceramic and sand molds). Furthermore, the reference suggests that ceramic molds are less expensive than sand molds and easier to fabricate.

Regarding claims 1 and 5, it would have been obvious to one having ordinary skill in the art at the time the invention was made, to have formed the Nitinol bearings elements of Rouverol et al/Hockin, by a casting process using a ceramic mold, in light of the teachings of either James et al or Noll et al, since sand molds and ceramic molds are known equivalents. *See In re Ruff*, 256 F.2d 590, 598 (CCPA 1958) (equivalence may be suggested by prior art).

Regarding claim 7, Hockin discloses that the balls may require some subsequently machining to yield a perfect sphere. Col. 3, lines 45-47. This clearly suggests a grinding process as known in the art.

7. Claims 2, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rouverol et al/Hockin/James et al in view of U.S Patent 4,302,256 to Kenton.

Rouverol et al/Hockin/James et al disclose the invention cited above. However, they do not disclose providing a hot isostatic pressing (HIP) treatment.

Kenton discloses generally providing a HIP treatment for castings in order to reduce and eliminate defects (e.g., microcracks) in the castings. *See* Abstract. The process is especially advantageous to nickel and titanium based alloys. Col. 1, lines 5-13. The reference discloses temperatures from about 1800 to 2350 °F and pressures from 5,000 to 50,000 psi for ½ to 16 hours, depending on the particular alloy. Col. 5, lines 58-67. *See also* U.S. Patent 3,496,624 to Kerr et al (disclosing temperatures from 700 to 1000 °F and pressures form 10,000 to 100,000 psi).

Regarding claims 2 and 6, it would have been obvious to one of ordinary skill in the art to have provided the bearing element of Rouverol et al/Hockin/James et al with a HIP treatment, in light of the teachings of Kenton, in order to reduce or eliminate defects in the casting. Regarding the specific particulars of the temperature, pressure, and time claimed, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

8. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rouverol et al/Hockin/James et al in view of U.S. Patent 1,472,922 to Lothrop and U.S Patent 5,928,065 to Shih.

Rouverol et al/Hockin/James et al disclose the invention cited above. Rouverol et al disclose forming roller bearing element, including rod-shaped roller elements (131). Thus, it such elements are formed by the method of Hockin then a rod of Nitinol would be inherently formed. Furthermore, Hockin suggests that the bearings elements may require some subsequently machining to yield a perfect shape.

However, they do not disclose cutting individual bearing parts from a rod or centerless grinding.

Lothrop disclose forming bearing elements (E) from a rod (A). The maximum diameter of the rod is first machining and then the individual elements (D) are cut to length for further processing. *See* Figures 1&4. This allows for much of the machining to desired shape to be performed on a plurality of bearing elements prior to cutting them off the rod. Page 2, Col. 2, lines 2-3.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have cast a rod of Nitinol as taught by Rouverol et al/Hockin/James et al, machining the rod and cut out individual parts to become bearing parts, in light of the teachings of Lothrop, in order to increase efficiency.

However, the references do not disclose centerless grinding.

Shih disclose a method and apparatus for centerless grinding bearing parts. *See* Col. 1, line 19. Centerless grinding is "especially advantageous for grinding applications

wherein the final ground workpiece dimension must fall within sub-micron tolerance requirements." Col. 8, lines 49-50.

Regarding claim 3, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have ground the bearing elements of Rouverol et al/Hockin/James et al/Lothrop by a centerless grinding process, in light of the teachings of Shih, in order to provide sub-micron tolerances for bearing parts.

Regarding claim 4, the references, especially Hockin, suggest final grinding the individual bearing elements. Thus, it would have been obvious to perform the final grinding by centerless grinding as suggested by Shih.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rouverol et al/Hockin/James et al in view of U.S Patent 4,023,988 to Sitckels et al.

Rouverol et al/Hockin/James et al disclose the invention cited above. However, they do not disclose a hardened step (i.e., heating and quenching) to increase the hardness of the bearing element.

Stickels et al disclose generally that it is known to provide a heat treatment to bearing elements to improve resistance to rolling contact fatigue. "When the rough formed shapes have become fully austenitized, they are quenched in hot oil ... and are tempered to a final hardness of Rc 60-64 using tempering ..." Col. 2, lines 26-31. It is well known in the art that the process of quenching resulting in the formation of some of the austenite, especially on the surface to martensite, a hard ceramic material. *See* Heat Treatment of Steels – An Overview. Nitinol is capable of assuming a martensite structure as well. *See* Selected Properties on NiTi Data Sheet. Furthermore, Applicant

discusses that "[Nitinol] is naturally hard and can be heat treated to a hardness on the order of 62Rc or higher." Specification, page 3.

Regarding claim 8, it would have been obvious to one of ordinary skill in the art to have provided the bearing element of Rouverol et al/Hockin/James et al with a heat treatment to produce a hardness of 62Rc, in light of the teachings of Stickels, in order to increase its "life against rolling contact fatigue." Col. 1, lines 49-50. Regarding the specific particulars of the temperature claimed, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

10. Claims 12-15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rouverol et al in view of U.S Patent 4,216,629 to Degaeta.

Rouverol et al disclose the invention cited above. However, Rourverol et al do not disclose forming the ball bearing elements by the process as claimed.

DeGaeta discloses a method of forming ball bearing parts (col. 1, lines 6+) comprising: grinding the ball blanks in a ball grinder to a desired spherical shape and size. *See* Col 1., lines 36+. Cylindrical blanks are disclosed to be formed from wire stock. Col. 4, lines 46-48. In the case of non-cylindrical blanks that are cubical (see col. 1, line 38), a skilled artisan would realize that sheet or plate material having a desired cross-section would be advantageous to use to reduce waste. *See generally* U.S. Patent 2,358,378 to Brenholtz, Page 2, Col. 1, lines 47-51 (disclosing cutting rectangular blanks from bar stock).

Regarding claim 12, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed the Nitinol bearing elements of Rourverol et al, by the ball bearing forming process of DeGaeta, in order to "produce substantially spherical balls which are very close to the desired finished size ..." Col. 1, lines 59-60.

Regarding claim 13-14, and 15, DeGaeta discloses the blanks may be cylindrical or cubical. Col. 1, line 39. Note: a cube by definition has a center and six equal orthogonal dimensions through the center.

Regarding claim 17, DeGaeta disclose the blanks are tumbled until they are substantially spherical and then they are lapped (i.e., ground). Col. 1, lines 46-56.

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rouverol et al/DeGaeta in view of U.S. Patent 4,724,297 to Nielsen.

Rouverol et al/DeGaeta disclose the invention cited above. It is inherent that the blanks are cut from the stock material. However, the references do not disclose laser cutting.

Nielsen disclosed generally industrial laser cutting techniques to cut metallic workpieces from sheet material to avoid the formation of burrs. *See* Abstract.

Regarding claim 16, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have cut the blanks of Rouverol et al/DeGaeta by laser cutting, in light of the teachings of Nielsen, in order to eliminate burrs formed by conventional cutting.

12. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rouverol et al in view of U.S Patent 1,472,922 to Lothrop.

Rouverol et al disclose the invention cited above However, Rouverol et al do not discloses forming the ball bearing races by the process as claimed.

Lothrop discloses a method of forming bearing races (E), comprising: selecting a tube (B.C) having a central axis; cutting bearing race blanks (D) off the tube at a plane perpendicular to the central axis (see Figures 4-5); and grinding or machining the race blanks to desire outside configuration and interior configuration (see Figure2; Col. 3, lines 25-27). It is known in the art to form bearing races from bars or tubes. Col. 1, lines 14-28.

Regarding claim 18, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have formed the Nitinol bearing races of Rouverol et al, by cutting blanks from a rod, in light of the teachings of Sommer et al, in order to increase production efficiency. Col. 2, lines 66-68.

13. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rouverol et al/Sommer et al in view of U.S Patent 4,023,988 to Sitckels et al.

Rouverol et al/Sommer et al disclose the invention cited above. However, they do not disclose a hardened step (i.e., heating and quenching) to increase the hardness of the bearing element.

Stickels et al disclose generally that it is known to provide a heat treatment to bearing elements to improve resistance to rolling contact fatigue. "When the rough formed shapes have become fully austenized, they are quenched in hot oil ... and are

tempered to a final hardness of Rc 60-64 using tempering ..." Col. 2, lines 26-31. It is well known in the art that the process of quenching resulting in the formation of some of the austenite, especially on the surface to martensite, a hard ceramic material. *See* Heat Treatment of Steels – An Overview. Nitinol is capable of assuming a martensite structure as well. *See* Selected Properties on NiTi Data Sheet. Furthermore, Applicant discusses that "[Nitinol] is naturally hard and can be heat treated to a hardness on the order of 62Rc or higher." Specification, page 3.

Regarding claim 19, it would have been obvious to one of ordinary skill in the art to have provided the bearing element of Rouverol et al/Sommer et al with a heat treatment to produce a hardness above 58Rc, in light of the teachings of Stickels, in order to increase its "life against rolling contact fatigue." Col. 1, lines 49-50. Regarding the specific particulars of the temperature claimed, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Allowable Subject Matter

14. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not teach or suggest a method of forming Nitinol

bearing comprising: casting a Nitinol rod and rotary forging the rod at an elevated temperature to produce a rod having a diameter slightly greater in diameter than the rolling bearing elements, in combination with the other claimed subject matter.

Response to Arguments

16. Applicant's arguments filed December 10, 2003, have been fully considered but they are not persuasive.

Applicant argues that the Tu and Goldstein references do not disclose that the Nitinol elements are "for use in a ball bearing for supporting a rotating shaft," as recited in the preamble of the claims 9 and 10 (as amended). If the body of a claim fully and intrinsically sets forth all of the limitations of the claimed invention, and the preamble merely states, for example, the purpose or intended use of the invention, rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165 (Fed. Cir. 1999). Furthermore, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (BPAI 1987).

Applicant argues that Rourverol teaches prestressing the Nitinol roller surfaces. Applicant amended claim 20 to require that bearing race is "free of substantial

compressive prestress." Furthermore, Applicant argues that his invention does not require prestressing.

With regards to prestressing, Rouverol discloses,

> [T]here is an interference fit, and the drawing together of the retaining rings 13, 14 by angular turning of ring 15 induces radial and circumferential compression in ring 12.
>
> Col. 2, lines 17-20.
>
> If a roller (not shown) is pressed radially outward against rolling surface 11, additional stresses, called "Hertzian stresses", will be induced in the ring 12.
>
> Col. 2, lines 26-28.
>
> If ring 12 is not only case-hardened, as by case-carburizing, nitriding or shot peening, but is also assembled into a structure such as shown in FIG. 1, it will have not only "residual stresses" as a result of its case-hardening, but additional compressive stresses in the axial and circumferential directions induced by the preloading described above. These latter stresses will hereinafter be referred to as "prestresses".
>
> Col. 2, lines 50-57.
>
> The total stresses that act on the elements of ring 12 will be the sum of the "residual stresses", the "prestresses", and the Hertzian stresses, and these three systems of stresses are all superposable within the elastic range of the ring 12 material.
>
> Col. 2, lines 58-62.]
>
> [S]hape-memory materials are useful in the present invention both for rolling surfaces and prestressing elements [and have] a modulus of resilience comparable to that of hardened steel.
>
> Col. 6, lines 35-43.

Thus, the prestressing disclosed therefore, is a result of case-hardening, the interference fit between the race and retaining rings, and preloading of the roller element. Applicant also relies on a heat treatment to case-harden the race. *See*

Specification, page 19, lines 18+. Also, it is well known that ball and roller bearings to function effectively are subject to preloading techniques, i.e., Hertzian stress. Rouverol also distinguished his invention using the shape-memory material from prior art shrink fitted assembly. Col. 6, lines 56-60. Thus, initially the race of Rouverol is not under any prestress resulting from its manufacture, in as much as Applicant contemplates. The prestress is the result of further manufacturing and assembly, as discussed above.

Rouverol primary invention discloses increasing the mechanical loads/stresses on bearing parts including bearing races. The use of shape memory alloys, e.g., Nitinol, appears to be a secondary teaching. Nonetheless, the reference discloses the use of Nitinol to form bearing elements, e.g., bearing races. Furthermore, the invention may be used with both hardened steel and shape memory alloys, e.g., Nitinol, since both material have a large modulus of resilience. Col. 4, lines 40-43 & Col. 6, lines 40-43. The reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. *In re Linter*, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon*, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990). Applicant's use of Nitinol for bearing elements is for corrosion resistance and high strength. *See* generally Specification, pages 1-4 (disclosing prior art and summary of invention). As indicated above, Rouverol discloses that Nitinol has a modulus similar to hardened steel. Likewise, it is well known that Nitinol has "excellent" corrosion performance. *See* Selected Properties on NiTi Data Sheet.

Thus, the Examiner has established a prima facie case of obviousness with respect to using Nitinol to form a bearing element (in particular claim 20).

Having established that Nitinol may be used to form bearing elements, the other arguments are believed to be moot. Rouverol does not disclose, to any detail, how to form the bearing elements. Thus, the other references are cited and relied on for their teachings of prior art methods of forming bearing elements as discussed in detail above.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Compton whose telephone number is (703) 305-0240. The examiner can normally be reached on M-F, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter B. Vo can be reached on (703) 308-1789. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9302.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1148.

Eric Compton
Patent Examiner
A/U 3726

DAVID P. BRYANT
PRIMARY EXAMINER